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THE DEPUTY COMMONWEALTH STATISTICIAN,
BOX 1433J, G.P.O., ADELAIDE.
TELEPHONE: WF 69



COMMONWEALTH BUREAU OF CENSUS AND STATISTICS

In reply quote No.

EIGHTH FLOOR,
DA COSTA BUILDING,
68 GRENFELL STREET,
ADELAIDE.

BUILDING OPERATIONS : NUMBER OF NEW HOUSES AND FLATS
(PRELIMINARY ESTIMATES)

SOUTH AUSTRALIA

DECEMBER QUARTER, 1960

Preliminary estimates of the number of new houses and flats commenced, completed and under construction during the quarter ended 31st December, 1960, are shown in the following tables together with comparisons for previous periods. Table 1 shows numbers of new houses, Table 2 numbers of flats and Table 3 numbers of new houses and flats combined.

The estimated totals shown for the quarter ended 31st December, 1960, have been based on returns obtained from most large builders and a substantial proportion of small builders and owner-builders. Figures for this quarter should be regarded as tentative only and will be revised when final figures are published in greater detail in the Quarterly Bulletin of Building Statistics, which will be published about the middle of March, 1961.

In Tables 2 and 3, the numbers of flats shown relate to individual new flats constructed as separate living units. Only new flats are included, i.e. flats obtained by the conversion of existing buildings are omitted.

Further particulars regarding definitions used, sources of information and the scope of these statistics are shown in the Quarterly Bulletins of Building Statistics.

TABLE 1 - NUMBER OF NEW HOUSES : SOUTH AUSTRALIA
(Including Owner-Built Houses)

Period	1954	1955	1956	1957	1958	1959	1960
COMMENCED							
Quarter ended							
31st March	1,499	1,799	2,001	1,537	1,515	1,958	2,413
30th June	1,795	1,993	1,907	1,740	1,815	2,356	2,145
30th September	1,653	2,348	1,742	1,932	1,914	2,265	2,573
31st December	1,745	2,121	1,813	1,689	1,897	2,086	(a) 2,360
Year	6,692	8,261	7,463	6,898	7,141	8,665	(a) 9,491
COMPLETED							
Quarter ended							
31st March	1,682	1,600	1,837	1,629	1,750	1,832	2,192
30th June	1,816	1,779	1,981	1,709	1,876	2,232	2,220
30th September	1,951	1,903	1,846	1,923	2,041	2,157	2,454
31st December	1,993	2,000	2,009	2,057	2,038	2,407	(a) 2,490
Year	7,442	7,282	7,673	7,318	7,705	8,628	(a) 9,356
UNDER CONSTRUCTION AT END OF PERIOD							
As at -							
31st March	5,778	5,393	6,329	5,823	5,260	5,057	5,189
30th June	5,750	5,602	6,252	5,854	5,199	5,181	5,114
30th September	5,447	6,047	6,145	5,863	5,072	5,289	5,233
31st December	5,198	6,165	5,944	5,495	4,931	4,968	(a) 5,103

(a) Preliminary estimate, subject to revision.

Vol. 67, No. 1, March 1972

Estimation of the Parameters of the Logistic Distribution

By J. R. HOSKINSON and J. R. HOSKINSON

Abstract: The maximum likelihood method is used to estimate the parameters of the logistic distribution. The asymptotic properties of the maximum likelihood estimator are derived. The asymptotic variance-covariance matrix of the maximum likelihood estimator is derived. The asymptotic normality of the maximum likelihood estimator is proved. The asymptotic efficiency of the maximum likelihood estimator is proved. The asymptotic normality of the maximum likelihood estimator is proved. The asymptotic efficiency of the maximum likelihood estimator is proved.

1. Introduction. The logistic distribution is a continuous probability distribution. It is defined by the probability density function

$$f(x) = \frac{e^{-x}}{(1 + e^{-x})^2}, \quad -\infty < x < \infty.$$

The cumulative distribution function is given by

$$F(x) = \frac{1}{1 + e^{-x}}.$$

The logistic distribution is a special case of the generalized logistic distribution.

2. Maximum Likelihood Estimation. Let X_1, X_2, \dots, X_n be a random sample of size n from the logistic distribution. The likelihood function is given by

$$L(\theta) = \prod_{i=1}^n f(x_i; \theta).$$

$$\ln L(\theta) = \sum_{i=1}^n \ln f(x_i; \theta).$$

$$\frac{\partial \ln L(\theta)}{\partial \theta} = \sum_{i=1}^n \frac{\partial \ln f(x_i; \theta)}{\partial \theta}.$$

$$\frac{\partial^2 \ln L(\theta)}{\partial \theta^2} = \sum_{i=1}^n \frac{\partial^2 \ln f(x_i; \theta)}{\partial \theta^2}.$$

$$\frac{\partial^3 \ln L(\theta)}{\partial \theta^3} = \sum_{i=1}^n \frac{\partial^3 \ln f(x_i; \theta)}{\partial \theta^3}.$$

$$\frac{\partial^4 \ln L(\theta)}{\partial \theta^4} = \sum_{i=1}^n \frac{\partial^4 \ln f(x_i; \theta)}{\partial \theta^4}.$$

$$\frac{\partial^5 \ln L(\theta)}{\partial \theta^5} = \sum_{i=1}^n \frac{\partial^5 \ln f(x_i; \theta)}{\partial \theta^5}.$$

$$\frac{\partial^6 \ln L(\theta)}{\partial \theta^6} = \sum_{i=1}^n \frac{\partial^6 \ln f(x_i; \theta)}{\partial \theta^6}.$$

$$\frac{\partial^7 \ln L(\theta)}{\partial \theta^7} = \sum_{i=1}^n \frac{\partial^7 \ln f(x_i; \theta)}{\partial \theta^7}.$$

TABLE 2. NUMBER OF NEW FLATS: SOUTH AUSTRALIA

Period	1954	1955	1956	1957	1958	1959	1960
COMMENCED							
Quarter ended							
31st March	32	33	2	83	151	94	151
30th June	83	12	8	73	133	172	218
30th September	22	15	95	126	256	177	210
31st December	5	106	44	89	229	270	(a) 115
Year	142	166	149	371	769	713	(a) 694
COMPLETED							
Quarter ended							
31st March	-	40	14	49	120	148	145
30th June	39	18	4	93	78	128	143
30th September	3	39	13	97	163	152	219
31st December	44	29	75	77	201	163	(a) 245
Year	86	126	106	316	562	591	(a) 752
UNDER CONSTRUCTION AT END OF PERIOD							
As at -							
31st March	71	88	117	204	256	378	560
30th June	115	82	121	184	311	422	635
30th September	134	52	203	213	404	447	626
31st December	95	129	170	225	432	554	(a) 496

(a) Preliminary estimate, subject to revision.

TABLE 3. -NUMBER OF NEW HOUSES AND FLATS: SOUTH AUSTRALIA
(Including Owner-Built Houses)

Period	1954	1955	1956	1957	1958	1959	1960
COMMENCED							
Quarter ended							
31st March	1,531	1,832	2,003	1,620	1,666	2,052	2,564
30th June	1,878	2,005	1,915	1,813	1,948	2,528	2,363
30th September	1,675	2,363	1,837	2,058	2,170	2,442	2,783
31st December	1,750	2,227	1,857	1,778	2,126	2,356	(a) 2,475
Year	6,834	8,427	7,612	7,269	7,910	9,378	(a) 10,185
COMPLETED							
Quarter ended							
31st March	1,682	1,640	1,851	1,678	1,870	1,980	2,337
30th June	1,855	1,797	1,985	1,802	1,954	2,360	2,363
30th September	1,954	1,942	1,859	2,020	2,204	2,309	2,673
31st December	2,037	2,029	2,084	2,134	2,239	2,570	(a) 2,735
Year	7,528	7,408	7,779	7,634	8,267	9,219	(a) 10,108
UNDER CONSTRUCTION AT END OF PERIOD							
As at -							
31st March	5,849	5,481	6,446	6,027	5,516	5,435	5,749
30th June	5,865	5,684	6,373	6,038	5,510	5,603	5,749
30th September	5,581	6,099	6,348	6,076	5,476	5,736	5,859
31st December	5,293	6,294	6,114	5,720	5,363	5,522	(a) 5,599

(a) Preliminary estimate, subject to revision.

Commonwealth Bureau of Census & Statistics,
Adelaide.

21st February, 1961.

(D.L.J. Aitchison)
Deputy Commonwealth Statistician.

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